

Verizon's exception, meanwhile, amounts in essence to an argument that the Judge failed to take adequate account of the competitive risks that it faces in offering UNEs. But that, too, is a matter of judgment; and we are satisfied that the Judge's analysis accounts adequately for those risks, particularly given our decision (discussed above) to use shorter depreciation lives and thereby mitigate Verizon's risk as well as Verizon's right to petition for increased UNE rates in the future in the event it believes it can justify such action. All told, an equity risk premium of 4.8 percentage points reasonably recognizes the risks at hand.

Applying that risk premium to an updated cost of debt (as of January 3, 2002) of 7.33% suggests a return on equity of 12.13% and an overall return of 10.5%, as shown in the following table:

	<u>PERCENTAGE</u>	<u>COST</u>	<u>WEIGHTED COST</u>
Debt	35%	7.33%	2.6%
Equity	65%	12.13%	7.9%
Total	<u>100%</u>		<u>10.5%</u>

#### LOOP COSTS

##### Introduction and Overall Method

Verizon studied the costs of providing unbundled access to two- and four-wire analog loops and two- and four-wire

digital loops.<sup>149</sup> Its cost studies claim to assume a fully forward-looking design based on next-generation digital loop carrier (DLC) technology, supported by fiber optic feeder cable, even though DLC is nowhere near universal deployment. Among other things, DLC provides for the conversion of analog signals into digital format in a remote terminal (RT) located in the outside plant, allowing for the direct delivery of digital line signals to digital line switch ports. Verizon maintains this configuration is always less costly than one that terminates an analog signal at the switch, assuming costs are analyzed by taking account of the loop/switch combination as a whole rather than of the loop alone. According to Verizon, "comparing loop costs, without reference to switching costs, is a fallacy that undermines most CLEC analysis of the relative costs of all-copper loops and fiber-fed DLC-equipped loops at short lengths."<sup>150</sup> Verizon cites in this regard our endorsement, in the First Elements Proceeding, of a 100% fiber feeder/DLC configuration, and it continues to regard that premise as consistent with TELRIC.

Verizon's loop architecture also assumes the use of forward-looking GR-303 technology, which, among other things, permits a smaller number of switch ports to serve a given number

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<sup>149</sup> According to Verizon, "a two-wire analog loop is a transmission circuit consisting of two wires that is used to both send and receive voice conversation in the 300-3000 Hz frequency range. This is the basic loop type used for providing voice-grade 'POTS' ["plain old telephone service"] service. A four-wire analog loop consists of two pairs, one to transmit and one to receive. It is used in certain private line and data service applications. A two-wire digital loop is a two-wire loop suitable for the transmission of certain high-speed data services. In particular, Verizon's two-wire digital ('premium') loop can be used to provide ISDN - Basic Rate interface ('BRI') service to an end-user customer. A four-wire digital loop will support DS1-level transmission. It can be used, among other things, to provide ISDN - Primary Rate Interface ('PRI') service to an end-user customer. (Tr. 2,421-22.)" Verizon's Initial Brief, pp. 108-109, n. 247.

<sup>150</sup> Id., p. 112.

of POTS loops.<sup>151</sup> Nevertheless, Verizon's studies consider not only the "integrated" DS1-level GR-303 interface but also a more costly DS0-level "universal" (non-GR-303) interface. This use of universal DLC (ULDC) interfaces rather than integrated DLC (IDLC) is controversial and is discussed below.

Along with the foregoing technology assumptions, Verizon's study posited use of existing outside plant routes and lengths, on the premise that they are driven by factors, such as geography and local land-use requirements, that will not change in a forward-looking environment. To determine the equipment that would be deployed along those routes, it randomly selected 55 wire centers (representing all three of its proposed density zones) and asked its outside plant engineers to develop a forward-looking design for each of the 242 feeder routes within those wire centers. It explained that "the engineers were asked to assume current customer and central office locations, and current routing of feeder cable, but otherwise to develop designs that were in no way constrained by the current, 'embedded' deployment of facilities. In this way, Verizon insured that the loop design underlying its studies would be fully forward-looking."<sup>152</sup> In determining the quantities of equipment to be deployed, Verizon made assumptions regarding utilization factors, and it applied what came to be called an "environmental factor," said to take account of zone-specific

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<sup>151</sup> The initially analog signal appears at the switch port as a DS0 digital channel (a voice-grade digital channel, i.e., a digital channel of the lowest capacity), having been converted to that format at the remote terminal. There is, however, no DS0-level loop/switch interface, and DS0s are grouped as a 24-channel DS1 for interconnection. The GR-303 interface group comprises up to 28 DS1 channel groups interconnecting a remote terminal and a switch, and it obviates a one-to-one association of switch ports and loops by taking advantage of the fact that only some customers will be requesting service at any given time and establishing a connection between a DS0 channel and a loop only when the customer picks up the phone. That phenomenon is referred to as "concentration." (Verizon's Initial Brief, p. 115.)

<sup>152</sup> Verizon's Initial Brief, pp. 118-119.

differences in the amount of work required to install outside plant. Finally, it developed a "link cost calculator" that costs out the facilities designed by the outside plant engineers.

Verizon studies were subjected to a variety of criticisms, some of which continue to be raised on exceptions. As in the recommended decision, issues related specifically to digital subscriber loops (DSL) are discussed in a separate section.

#### Network Design and Loop Configuration

A major source of controversy in the First Elements Proceeding was Verizon's assumption of 100% fiber optic feeder; other parties argued, in general, that for relatively short loops (various cross-over points were identified) copper feeder would be less expensive, and the Hatfield Model contemplated its use. We ultimately determined to use the 100% fiber feeder network, finding that when installation and maintenance, among other things, were taken into account, fiber offered cost and operational advantages that warranted its use even for relatively short narrow band loops.<sup>153</sup> In the present proceeding, there is general (though not universal) agreement that all-fiber feeder is the technology of choice as long as it is deployed in a manner that maximizes its advantages; but several CLEC parties denied that Verizon had done so.

After reviewing the arguments, the Judge concluded that Verizon had "for the most part, successfully defended its network design."<sup>154</sup> But he applied several adjustments, which are the subject of exceptions by Verizon (for having been made at all) and by WorldCom (for not having gone far enough).<sup>155</sup>

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<sup>153</sup> Phase 1 Opinion, pp. 82-84; Phase 1 Rehearing Opinion, pp. 22-29.

<sup>154</sup> R.D., p. 87.

<sup>155</sup> One network configuration issue--the number of remote terminals per central office terminal--is considered in the context of fill factors.

1. Concentration Ratio

As already suggested, the concentration ratio represents the degree to which the number of loops can exceed the number of ports on the premise that a connection between a port and a loop will be needed only when the customer picks up the phone. WorldCom called for increasing the ratio from the 3:1 proposed by Verizon to as high as 6:1; Verizon contended, among other things, that so high a ratio could result in inadequate port capacity and blocked traffic. The Judge found that Verizon had not borne its burden of proving a 3:1 concentration ratio to be the absolute maximum but that a ratio as high as 6:1 could indeed imperil service and, "to ensure that prices set on the basis of a reasonable, least-cost premise,"<sup>156</sup> he recommended a concentration ratio of 4:1. Verizon and WorldCom except.

Verizon continues to advocate its 3:1 concentration ratio, which it says represents the judgment and experience of its network engineers on the best way to balance the countervailing interests in minimizing port costs per loop through a higher concentration ratio and avoiding the call blocking that would result if a free switch port were unavailable when needed because the ratio was too high. It reiterates its argument that a Verizon document cited by WorldCom in support of a 6:1 ratio did not in fact support that ratio in practice, contends as well that the Judge's recommended 4:1 ratio had no support in the record, and insists that the only relevant data in the record was Verizon's expert's testimony in support of the 3:1 ratio. Verizon adds that the 3:1 ratio is used in an actual network planning guideline and that it has no interest in increasing its own retail costs through an inefficient network design, given that its local exchange rates are capped by its PRP. Verizon warns that we "should be extremely reluctant to endorse potential service-affecting changes in network management guidelines based on

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<sup>156</sup> R.D., p. 88.

nothing more than intuition."<sup>157</sup> It suggests as well that a forward-looking construct might require a lower concentration ratio because of longer holding times attributable to internet usage.

WorldCom, meanwhile, continues to urge a 6:1 concentration ratio, contending that it is supported by Verizon's economic and network planning studies. In its view, a 4:1 ratio does not make optimal use of NGDLC technology and therefore does not reflect least-cost network design as required by TELRIC. Verizon responds that WorldCom has offered no basis for challenging the Judge's conclusion that a concentration ratio as high as 6:1 could imperil adequate service, and it reiterates its explanation that the Verizon planning document relied on by WorldCom used the 6:1 ratio only as a strawman in a study conducted before the 3:1 concentration ratio was established as the actual field design guideline. WorldCom's reply, meanwhile, disputes Verizon's claim that no party provided evidence contrary to its 3:1 proposal, asserting that "Verizon is not given license to claim that no contradictory evidence exists simply because it does not like the contradictory evidence with which it was presented."<sup>158</sup> WorldCom characterizes Verizon's concerns about effects on service as a red herring and reiterates its argument that Verizon's concerns about call blockage arise from inefficiencies in the legacy network that would not exist in a forward-looking construct.

In effect, WorldCom's exception continues to claim that the Verizon planning document it cites is something other than what it appears to be, and Verizon's exception ignores the fact that while the planning document cannot be relied on to establish a 6:1 concentration ratio, it constitutes record evidence that a 3:1 ratio is not the only one that could be reasonably considered. In settling on a 4:1 ratio, the Judge reasonably took account of the state of the record as a whole

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<sup>157</sup> Verizon's Brief on Exceptions, p. 28.

<sup>158</sup> WorldCom's Reply Brief on Exceptions, p. 30.

and of the countervailing interests at stake. We adopt that ratio for costing purposes; both exceptions are denied.<sup>159</sup>

2. Integrated v. Universal DLC

Verizon studied two alternative loop/switch interfaces: the integrated DS1-level interface and the universal DS0-level interface. The latter is more expensive, but Verizon maintained its use was dictated in some circumstances by service choices made by the CLEC. Several CLECs disputed that premise.

The Judge credited the CLECs' argument that GR-303 technology should be able to obviate UDLC at least in the near future and that a properly forward-looking TELRIC analysis should take account of that. He noted as well, however, that the capacity may not be available now and that its timing was less than certain. Applying a procedure used in the First Proceeding in analogous situations, he recommended that rates be set now on the basis of UDLC connections in the situations where Verizon proposed to do so, but that they be adjusted downward one year from the date of the recommended decision, to reflect IDLC connections, unless Verizon could show that it would be unreasonable to make that adjustment. Verizon and several CLECs except.

Verizon objects to what it characterizes as a rebuttable presumption that the UDLC rate should be eliminated within one year. The issue, it asserts, is that GR-303 systems support only a DS1-level interface--"a fact that is not a minor, as yet unresolved technical blemish but one that lies at the heart of the GR-303 concept. There is no technical development that will 'cure' that fact, and no party introduced evidence to

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<sup>159</sup> Verizon notes further that the 4:1 ratio was applied, in the Staff workpapers accompanying its rate recalculations, to universal interfaces and DS-1 central office terminals, neither of which support concentration, and that these errors should be corrected whatever the concentration ratio may be. Verizon's point is well-taken and the needed correction will be made.

the contrary."<sup>160</sup> Accordingly, a CLEC wishing to take advantage of GR-303 would have to purchase an entire DS1 level interface, comprising 24 DS0 channels, and doing so would be uneconomic for a CLEC wishing to purchase only a few loops at a particular central office terminal. Verizon therefore maintains the UDLC is a lower-cost alternative for some CLECs even in the forward-looking environment.

AT&T, WorldCom, and Covad object to any UDLC rate even for the short term. They contend that GR-303 technology can accommodate DS0 unbundling, pointing to record evidence of several methods for doing so. WorldCom asserts that the current state of Verizon's network should be disregarded inasmuch as GR-303 technology is technologically deployable and does not require access to a universal interface. Covad notes that there was no intimation in the First Elements Proceeding, where Verizon advocated use of IDLC, that use of that technology would require CLECs to purchase loops in groups of 24. It characterizes the recommended decision as giving Verizon a gift by allowing it to charge on the basis of embedded costs for one year.

In response, Verizon does not deny the technical feasibility of connecting a single voice-grade loop to an ILDC interface, but it insists that doing so would be inefficient, requiring the CLEC to bear the costs of a full DS1-level interface and, under some of the alternatives technologically available, requiring additional equipment. In response to Covad's observation about the Phase 1 decision, it notes that the purpose of this proceeding is to update and improve the rates set in Phase 1.

In a related issue raised for the first time on exceptions, AT&T and WorldCom urge that even if the recommended decision is adopted on this issue, the UDLC rates should not be applied to loops purchased as part of the UNE platform (UNE-P). WorldCom notes that Verizon's testimony proposed to price loops on the basis of UDLC only where the CLEC interconnects with

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<sup>160</sup> Verizon's Brief on Exceptions, p. 29.



Verizon's loop network (UNE-L), which is not the case when UNE-P is purchased. They urge clarification on that point; AT&T adds a request for clarification that the UDLIC rate would apply to UNE-L only where the CLEC elects to interface with Verizon at the DS0 level rather than the DS1 level. In addition, AT&T asks for clarification that the digital port rate applies to UNE-P.

In response, Verizon objects to what it characterizes as this deaveraging of UNE-P loops, suggesting that it would discourage facilities-based competition by imposing higher loop rates on CLECs that install their own switches. It suggests, instead, that a blended rate be set for all UNE loops, reflecting the relative proportions of IDLC, UDLIC, and copper interfaces that will be encountered in the actual forward-looking network.

It seems clear that a IDLC connection can be made with a single DS0 loop; the question is whether it can yet be done in a manner that avoids making available to the CLEC (and, in fairness, requiring the CLEC to pay for) the remaining 23 DS0 loops in the DS1 bundle. The Judge properly recognized that that question is now unanswered but may eventually be answered positively, and we deny both exceptions. During the interval remaining before the review of the matter in May 2002, Verizon should work with interested CLECs to ascertain whether a single DS0 loop can, in fact, be unbundled and connected to an IDLC interface in a cost-effective manner.

In requesting clarification that UDLIC rates would not apply to loops purchased as part of the UNE-P, AT&T and WorldCom seek a form of deaveraging that appears to be an unwarranted refinement in view of the uncertainty regarding the continued need for UDLIC. In the event it becomes clear, when the matter is revisited in May, that UDLIC-based pricing for DS0 loop connection will remain in place, the deaveraging favored by AT&T and WorldCom should be further examined. In addition, parties at that time should consider the possibility that the additional costs of a UDLIC DS0 connection are better regarded as a switching cost rather than a loop cost. For now, rates should be set on a blended basis, along the lines suggested by Verizon.

Demand Forecast and Utilization Factors

Determining the needed level of investment requires assessing the demand for service over a pertinent period and the utilization (or "fill") factor for the equipment, i.e., an "estimate of the proportion of [the] facility that will be 'filled' with network usage."<sup>161</sup> Higher fill factors imply less investment and consequently lower rates; the countervailing risk is that too high a fill factor may imply investment insufficient to provide adequate service.

In this section we first discuss the demand forecast, which the parties and the Judge considered in the context of the fill factor for loop distribution plant. That fill factor, which attracted the greatest degree of attention, is considered next, followed by a number of other fill factor issues related to loops. Fill factors related to other elements are discussed later in this order.

1. Demand Forecast

Verizon took account of "ultimate demand," that is, it recognized growth over a ten-year period. The Judge agreed with Verizon that the FCC had not ruled out the use of ultimate demand, which had to be taken into account to insure that the contemplated system would be properly sized, but he agreed as well with AT&T that current customers should not bear the full cost of serving demand that is not expected to eventuate for ten years. He dismissed AT&T's method for allocating those costs as needlessly complex and cumbersome, and he determined that ultimate demand should be recognized by taking account of the net present value of the ten-year average demand, assuming annual growth of 3%--the midpoint of the 2% to 4% annual growth that Verizon envisioned.

On exceptions, Verizon sees no basis for the adjustment, maintaining that planning on the basis of ultimate demand is needed to prevent service disruptions that would

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<sup>161</sup> Local Competition Order, ¶682.

affect current customers and that the cost of the needed cushion is properly regarded as a cost of serving current demand. Current customers, it continues, pay charges that represent only the current period costs of the ultimate demand while future customers pay the future period costs; overall, "the customers in each period pay only the costs accrued in that period for the investments necessary to effectively serve the demand in that period, including 'cushion' investments."<sup>162</sup> In Verizon's view, the Judge's recommendation would guarantee underrecovery, since it would take no account of the additional investment needed to serve the future demand that is, in effect, being reallocated into the present. Verizon notes as well (and is joined in this regard by AT&T) that while the recommendation was to use the present value of the ten-year average demand, Staff's workpapers show that the adjustment was made on the basis of the simple average. In addition, the adjustment was applied to the whole loop rather than just to distribution cable, even though most of the other loop components are not sized on the basis of ultimate demand.

AT&T replies that Verizon's justification for imposing the cost of the entire network on current period customers is inconsistent with the ultimate demand planning concept, intended to avoid having to add increasing amounts of new spare capacity on an ongoing basis. Arguing that Verizon's method would require current period customers to pay the cost of currently required network facilities plus those needed for ten years of future growth and demand, it asserts that "Verizon is attempting to have its cake and eat it too by suggesting that it be permitted to recover the costs of ultimate demand at the front end, and then treating the ultimate demand concept as if it were in fact not ultimate at all but rather adjustable upward with every incremental growth in demand."<sup>163</sup> With regard to the implementation errors cited by Verizon, AT&T agrees that Staff's workpapers failed to use present value analysis but contends

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<sup>162</sup> Verizon's Brief on Exceptions, p. 34.

<sup>163</sup> AT&T's Reply Brief on Exceptions, p. 43.

that its use would decrease calculated loop costs rather than increase them. It also disputes the suggestion that loop components other than distribution cable are not designed on the basis of ultimate demand, pointing to Verizon's instructions, in the survey on which its cost study rests, that the entire loop be designed to accommodate ten years of anticipated growth.<sup>164</sup>

WorldCom likewise notes that without the Judge's adjustment, costs would be spread only over current demand, and today's customers would be forced to bear the costs of future growth.

The Judge struck a fair balance between the need to take account of ultimate demand for planning purposes and the need to spread the costs of doing so in a manner that is fair to both present and future customers. Verizon's exception establishes no flaw in the balance he struck, and it is denied. The calculation carrying out the Judge's recommendation should be corrected in the manner agreed on by both parties. His adjustment should be applied to the entire loop unless Verizon can show, when it makes its compliance filing, that loop components other than distribution cable were not sized on an ultimate basis even though it appears, from the instructions cited by AT&T in its reply brief on exceptions, that they were.

## 2. Distribution Fill Factor

In the First Elements Proceeding, we adopted a 50% distribution fill factor. In the present case, Verizon assumed a 40% fill factor while various CLECs called for factors ranging from 50% to 75%. Emphasizing that "in resolving this issue we are pursuing not truth so much as fairness and reasonableness,"<sup>165</sup> the Judge found that the record suggested a range of reasonable factors running from something above 40% to something below 56%. Using Verizon's analysis but adjusting it in several respects, he settled on a distribution fill factor of 50%. Verizon, WorldCom, and AT&T except.

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<sup>164</sup> Id., p. 44.

<sup>165</sup> R.D., p. 96.

Verizon's quantitative analysis in support of its 40% fill factor<sup>166</sup> began with a 60% factor, reflecting two lines per zoned household--necessary to accommodate long-term potential peak demand in the distribution area--and actual household demand of about 1.2 lines. Actual demand will be reduced on account of undeveloped land, vacancies, and the fact that some customers will not use Verizon's infrastructure; and Verizon therefore multiplied its 60% factor by 90% to reflect unbuilt but zoned land, 95% for vacancies, 90% for customers who do not use Verizon's wireline network, and 90% for breakage.<sup>167</sup> The resulting figure was a fill factor of 41.6%.

In considering Verizon's analysis, the Judge first determined, in view of the recent trend, that AT&T's estimate of 1.3 lines per household appeared more reasonable than Verizon's figure of 1.2, but he invited parties to present updated data, if available, on exceptions. Verizon reports in its brief that the figure for January 2001 was 1.26 lines per household, but it continues to argue that 1.2 is a better long-run, forward-looking estimate because increased penetration of DSL service and cable modems will cut into demand growth for second lines. AT&T responds that the Judge's figure of 1.3 lines is supported by record evidence and logical analysis.

The Judge next reduced Verizon's adjustment for undeveloped parcels from 10% to 5% on the premise that undeveloped parcels will presumably be developed in the future. Verizon argues that new undeveloped land is added in a service area as existing undeveloped parcels are filled, resulting in a dynamic equilibrium in which population growth is balanced by the platting and zoning of new land. Even in mature areas, it

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<sup>166</sup> Verizon maintained as well that the 40% factor was supported by the estimates of its central engineering staff presented in Phase 1 and by application of adjustments and corrections to the 50% factor we there adopted.

<sup>167</sup> Breakage refers to what is otherwise termed the "lumpiness" of investment, *i.e.*, the existence of minimum quantities of installable capacity, which makes it impossible to precisely match new installations with demand.

adds, developed lots may be lost to abandonment or changes in use. The Judge also reduced from 10% to 5% Verizon's adjustment for customers lost to competitors, reasoning that the loss of customers would be offset somewhat by customers acquired as undeveloped parcels are developed. Verizon regards the Judge's treatment as fallacious, inasmuch as the land usage estimate relates customer locations to the maximum possible number allowed by zoning while the competitive loss adjustment applies to actual customers, the percentage of whom will be lost to competition will not decline as the number of living units increases. With respect to both adjustments, AT&T replies that Verizon would place too much weight on the judgment of its own experts and allow insufficient leeway for the exercise of the Judge's judgment and our own. It contends that the Judge's treatment of these adjustments falls within the range of reasonableness identified on the record. The CLEC Coalition likewise endorses the Judge's reasoning, noting, among other things, the overlap among Verizon's adjustments.

Verizon adds, overall, that the Judge is in effect asserting that Verizon should be deploying less spare capacity than it currently deploys, and it urges us to recognize the potential effects of such a determination on service quality.

WorldCom's exception continues to urge a fill factor higher than 50%, noting that a recent publication of Telcordia (formerly Bellcore) shows a nationwide average loop fill factor of 65%. It asserts that the loop rates resulting from the 50% fill factor proposed by the Judge "remain unjustifiably high."<sup>168</sup> It notes as well that the FCC used a 75% fill factor in its universal service order.

Verizon replies that the FCC made it clear that its universal service proxy model is not applicable to UNE pricing and that the Telcordia figure--which is, in any event, extra-record--refers to feeder cable, not distribution cable.

In resolving this issue, it is important to keep in mind the Judge's point that there is no one "right" number that

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<sup>168</sup> WorldCom's Brief on Exceptions, p. 23.

we are seeking; rather, we need a fair and reasonable estimate that takes account of the available information and the concerns at stake. The matter is inherently one on which informed judgments can differ.

The Judge found that AT&T's estimate of 1.3 lines per household is a better figure than Verizon's 1.2 lines; that view is strengthened by the recent data reported by Verizon. The Judge's other modifications to Verizon's adjustments, like the adjustments themselves, were less tied to specific evidence, but they, too, rested on sound rationales. Verizon's critique of the Judge's reasoning certainly suggests that it would have been wrong to disallow the adjustments entirely, but that is not what the Judge did. He recognized the conceptual merit of the adjustments but, applying his judgment to all the information before him, found a need to reduce them to avoid the risk that their net overall effect was overstated. The resulting fill factor of 50% is well within the range suggested by the record as a whole, and Verizon's exception to it is denied.

### 3. Other Utilization Factors

#### a. Remote Terminal Electronics

Verizon proposed a fill factor of 84% for RT electronics, which it sought to justify as the 90% objective fill factor, adjusted downward to allow for growth (4%) and churn (2%). The CLEC Alliance and WorldCom urged a 90% factor, arguing, in effect, that churn and growth were adequately accounted for in the difference between 100% fill and 90% fill. The Judge credited Verizon's explanation of why the objective fill factor of 90% did not in itself allow adequately for growth and churn, but he also found that Verizon had failed to show why its separate growth and churn factors were necessary and reasonable. Taking account of the need for fairness and of Verizon's burden of proof, he recommended a fill factor of 88%, which would allow a total of 2% for growth and churn.

Verizon excepts, contending that its fill factor is supported by the record and that the Judge cited no data and provided no analysis in support of his adjustment. Pointing to

the record, it explains how it calculated the 4% churn factor and 2% growth factor; cites recent data suggesting a statewide churn factor as high as 5.5% and suggests it was conservative in using the 4% figure associated with the New York metropolitan area; and argues that the two adjustments are cumulative and that each would be required in the absence of the other. It adds that forward-looking utilization factors can not be measured, because they are based on a network design not yet fully deployed, but that its analysis was based on engineering judgment and actual data and suggest the Judge's rejection of that analysis on burden of proof grounds sets a standard that cannot be met.

In response, AT&T cites the Judge's statement that "Verizon has explained why the objective fill factor of 90% does not in itself allow adequately for growth and churn, but it has not shown that its separate growth and churn factors are both necessary and reasonable."<sup>169</sup> It contends that Verizon's exception focuses only on the second clause of that statement, failing to recognize the implication of the first clause that growth and churn are recognized in part, albeit it not adequately, in the 90% factor. Accordingly, it suggests, the Judge found an additional 2% allowance to be adequate. WorldCom likewise defends the Judge's recommendation as record-based, but continues to support its own 90% fill factor.

Verizon has met its burden insofar as it has shown that growth and churn are separate matters, and the Judge properly found that they were not adequately allowed for in the 90% objective fill factor. But there nonetheless is overlap between the reasonable ranges for these items, and the Judge reasonably concluded that 88% was a figure that adequately took account of all of them. Verizon's pure reliance on actual data is insufficient; again, some forward-looking analysis is required. We adopt the Judge's recommendation as a sound exercise of judgment.

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<sup>169</sup> R.D., p. 99.



b. RT Enclosures and COTs

For remote terminal enclosures, Verizon used fill factors of 70.9% in the Manhattan zone, 56.7% in the major cities zone, and 44.8% in the rest-of-state zones. The CLEC Alliance and WorldCom recommended a factor of 84%, which the Judge rejected on the basis of qualitative considerations identified by Verizon as suggesting that figure was too high. He found, however, that Verizon had failed to make a quantitative showing in support of its own fill factors and, "recalling once again that Verizon bears the burden of proof, and recognizing that there is considerable flexibility in designing RT enclosures (even if not as much flexibility as WorldCom and CLEC Alliance would have it), [he recommended] that Verizon's proposed RT enclosure fill factor in each zone be adjusted upward by 15%."<sup>170</sup> He likewise recommended a 15% upward adjustment in Verizon's utilization factor for central office terminals (COTs), rejecting the CLEC Alliance and WorldCom's recommended factor of 90% but noting the need to take account in this utilization factor of Verizon's failure to show convincingly that more than two RTs per COT would be unacceptable.

Verizon excepts, again alleging no quantitative or analytical support for the Judge's adjustment, based solely on a finding that Verizon had failed to meet its burden of proof. It adds that the utilization factors for RT enclosures and COTs are not an input parameter to its cost studies; rather, they emerge after the fact from the routes designed by Verizon's engineers on the basis of forward-looking engineering considerations, including the need to allow for growth and modularity in the size of available facilities. There is, accordingly, no one spreadsheet item that can be adjusted, and Staff's workpapers applied the adjustment by multiplying the number of lines served by the facilities by 115%. Verizon argues that the result of that calculation include facilities that exceed their capacity (that is, with utilization factor greater than 100%) or that are

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<sup>170</sup> R.D., pp. 99-100.

unreasonably close to their capacity. Verizon presents in a attachment to its brief examples of these phenomena, contending they demonstrate the adjustment to have been unwarranted.

AT&T responds by again asserting that Verizon has ignored the analysis in the recommended decision, which refers, among other things, to Verizon's ability to deploy facilities in a way that can maximize their utilization. It suggests the Judge did not explicitly find that Verizon had failed to meet its burden of proof but, instead, simply recognized that burden, placing it in the context of the regulator's need to keep in mind that the "utility has a clear self-interest in erring on the side of high cost forecasts."<sup>171</sup> AT&T therefore regards the Judge's skepticism about Verizon's specific factors as proper and asserts that "since ultimately all factors reflect prediction and judgment, they are not susceptible to proof to a mathematical certainty. [His recommended decision] is quite correct in not accepting uncritically Verizon's own judgments as to the precise level of fill factors for RT enclosures and COTs."<sup>172</sup> Finally, AT&T sees the 15% adjustment as affecting the costs to be recovered by Verizon through its UNE rates, and in no way undermined by the fact that when it is applied on a facility-by-facility basis--something necessitated only by the design of Verizon's cost study--it results in some facilities exceeding 100% of their capacity. The adjustment, according to AT&T, "will of course have no real world effect on the actual utilization or capacity of any particular Verizon network facility."<sup>173</sup>

WorldCom's exception, meanwhile, maintains that Verizon's assumption of only two RTs per COT fails to capture forward looking efficiencies and that the matter is not adequately addressed by the Judge's adjustment to the fill factor. It urges a fill factor of 90% and an assumption of five

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<sup>171</sup> R.D., p. 87, cited at AT&T's Reply Brief on Exceptions, p. 48.

<sup>172</sup> AT&T's Reply Brief on Exceptions, pp. 48-49.

<sup>173</sup> Id., p. 50.

RTs per COT in order to spread COT costs over more loops, citing a portion of the proprietary record as support for its premise. WorldCom urges as well an 84% fill factor for RT enclosures, renewing its contention that Verizon's fill factors are unreasonably low and contending that the Judge's 15% adjustment is inadequate.

In response, Verizon argues that its network planning guidelines--cited by WorldCom as encouraging multiple RTs--note the additional costs that may be associated with multiple RTs, including the need for round-the-clock access. Because of such concerns, it continues, multiple RTs are used only where the alternative would be grossly inefficient underutilization of COTs, which is not the case in Verizon's studies. It sees no basis for the utilization factors proposed by WorldCom and notes, among other things, that minimum size RT enclosures often cannot be installed on the sites that are available, requiring the use of a larger enclosure and consequently reduced fill factor.

The possible difficulties identified by Verizon with respect to multiple RTs preclude outright adoption of a multiple RT network design premise, but, as already suggested, the potential use of multiple RTs is something that can be reflected in the COT fill factor. The Judge's 15% adjustment does so, and it is adopted.

With respect to RT enclosures, the Judge's adjustment again took account of the record as a whole, and recognized the design flexibility that was available. AT&T has explained why the seeming anomaly identified by Verizon on exceptions is not dispositive, and the Judge's adjustment is adopted.

#### Environmental Factor

To test its intuitive hypothesis that the amount of work required to install outside plant might vary by geographic area, Verizon analyzed its engineering and construction records information system (ECRIS) data to identify such variation and

found higher costs in dense areas such as Manhattan.<sup>174</sup> The study compared, by geographic region corresponding to Verizon's nine strategic business units (SBUs) and three density zones, the actual labor time required to perform outside plant work operations against the standardized time for the same work operations. The standardized times, developed by Verizon's consultant H. B. Maynard and Company, estimate "the standard, average time for performing the function, regardless of where in the State it is performed, except for minor differences in the travel time to and from the work site."<sup>175</sup> Actual and standard times alike take account of the types and amounts of plant that is placed, rearranged, or removed; but the actual time considers, as well, factors that depend on locale and density specific conditions. These include, among others, "traffic conditions at the work site; terrain requiring hand digging; locations requiring the removal and restoration of fences, posts, and other objects; locations requiring landscaping; locations requiring minimum two-person crews; locations requiring the removal of waste contaminants (with contractors); locations requiring security arrangements."<sup>176</sup>

The analysis was performed by Verizon's statistical consultant NERA, which examined more than 388,000 individual work operations associated with over 4,000 outside plant estimate jobs throughout the state. The study found that the Manhattan had an actual-to-standardized-labor-time ratio of 1.59, the highest in the State, and that the statewide average ratio was 1.37. (Verizon explained a statewide average greater than 1.0 by noting that the ECRIS standardized times do not account for all the costs actually incurred in performing outside plant work, omitting the locale-specific conditions that

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<sup>174</sup> It should be recognized that previous deaveraging studies took account of inter-zone differences in technology, equipment deployment and loop length. They did not take account of zone-specific differences in the amount of work required to install outside plant.

<sup>175</sup> Verizon's Initial Brief, p. 137.

<sup>176</sup> Id., pp. 137-138, n. 313, citing Tr. 2,472-2,473.

show up in actual worktimes.) Asserting that NERA's statistical analysis shows the differences in the ratios to be statistically significant, Verizon argued that these costs must be taken into account in determining loop costs.

CLECs objected to the environmental factor on several grounds, contending that it would undo the forward-looking considerations reflected in the ECRIS standard time increments and asserting that application of the environmental factor impeaches the ECRIS database that Verizon otherwise relies on.

The Judge found the environmental factor to be reasonable in principle as a method to recognize empirically derived geographical cost differences. He was unpersuaded, however, by Verizon's attempt to explain why the statewide average actual-to-standardized ratio substantially exceeded unity; if the reason was that the ECRIS standardized times failed to include all pertinent costs, he held, Verizon was, indeed, impeaching its own ECRIS estimates. He therefore recommended that Verizon be required to recalculate the environmental factor in a manner that assumes a statewide average of 1.0 and adjust each regional environmental factor pro rata. Verizon excepts to that modification; AT&T and WorldCom except to adoption of the environmental factor in principle.

WorldCom and AT&T both note that ECRIS data have been relied on for years and that the standard time increments assume forward-looking efficiencies and labor. The environmental factor, they contend, would eliminate those efficiencies. WorldCom sees no basis for Verizon's assertion that the difference between standard time increments and actual times are caused by environmental conditions rather than inefficient work practices, noting that the NERA analysis measured only the differences and did not attempt to determine their causes. It contends as well that the record shows that ECRIS estimates include locale-specific costs,<sup>177</sup> obviating any adjustment on that account. AT&T suggests that the effect of the environmental factor, even when reduced as recommended by the Judge, shifts

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<sup>177</sup> Citing Tr. 4,702-4,704.

costs among geographic density zones within the State in an unjustified manner.

Verizon responds that while ECRIS already reflects such locale-specific items as travel time and hourly labor rates, the environmental factor captures, in a manner superior to ECRIS, other matters such as traffic jams and weather conditions that cannot be anticipated for specific jobs. That these factors "vary systematically by geography," it says, "shows that they cannot be facilely attributed to inefficiency, as WorldCom attempts to do."<sup>178</sup>

In its own exception, Verizon renews its argument that its analysis confirmed, in a statistically significant manner, the intuitive belief that there were significant geographic variations in worktimes for various tasks. The ratio of actual to standardized times for Manhattan was 1.59, the highest identified; the statewide average was 1.37. Verizon objects to the Judge's recommendation to reduce the statewide average to 1.0, noting that it would have the effect of reducing the Manhattan ratio to 1.16. Because the ECRIS standardized times do not account for "locale-specific conditions" such as time lost due to traffic activity or weather conditions, it says, the Judge's recommendation would improperly disregard those costs. It disputes as well the suggestion that the difference between standardized and actual times is attributable to inefficiency, citing its witness's testimony that the PRP provides incentives to efficiency and that the statistically significant geographic variation in any event belies the suggestion. Verizon likewise denies that it is impeaching the ECRIS estimates, which have their purpose but do not necessarily reflect all of the costs that should be taken account of in a TELRIC analysis. It notes that in actual field applications the ECRIS factors are increased by certain locality specific adder variables and that the factors incorporated here simply represent another type of variable.

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<sup>178</sup> Verizon's Reply Brief on Exceptions, p. 23.

AT&T responds that the Judge's recommendation (which it objects to for reasons already noted) would recognize geographic differences without permitting "use of the environmental factor as a backdoor mechanism for increasing Verizon's indicated costs on a statewide basis."<sup>179</sup> Z-Tel likewise responds that the Judge's adjustment insures that the environmental factor recognizes geographic variations without increasing costs overall and expresses skepticism that Verizon would rely on the ECRIS database in the conduct of its business if the database understated costs to the extent Verizon contends here.

It is indisputable that costs differ from one geographic area to another, and proper cost analysis should take reasonable account of those differences. Verizon presented its environmental factor primarily as a mechanism for doing so, and the Judge accordingly understood it as a deaveraging measure that should not increase the overall average cost. His adjustment applied that understanding, reducing the overall environmental factor to unity.

Verizon now contends that the point of the environmental factor is not only to deaverage but also to recognize costs that simply are not included in the ECRIS standardized worktimes. As part of that process, the base to which the environmental factor was applied was first reduced to exclude the locale-specific "adders" already build into ECRIS. Application of the environmental factor represented an effort to restore the adders in a manner that calculates the variation more rigorously; and it is that restoration that accounts for a statewide average ratio (of costs reflecting the environmental factor to ECRIS costs net of any adders) greater than one. Verizon asserts on exceptions that restoration of the adders alone would have produced a statewide average ratio of 1.32, and it argues that the theory behind the Judge's adjustment would

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<sup>179</sup> AT&T's Reply Brief on Exceptions, p. 52.

warrant reducing the 1.37 ratio only to 1.32, not all the way to 1.0.<sup>180</sup>

The difficulty with Verizon's position, however, is that it effectively adjusts the ECRIS worktimes to take account of actual costs in a manner that may substantially undo the reflection in ECRIS of forward-looking efficiencies. Verizon itself has characterized ECRIS as one of the features contributing to the TELRIC-compliance of its studies, inasmuch as the ECRIS "standard time increments assume forward looking efficiencies in labor that have not been achieved in actual experience."<sup>181</sup> A TELRIC-compliant study can (and should) take account of geographic variation, but Verizon's calculation of the costs to be added to recognize geographic variation fails to distinguish between costs genuinely attributable to locale-specific circumstances and those resulting from inefficiencies that a forward-looking study should disallow.

That failure on Verizon's part would warrant adoption of the Judge's adjustment, to ensure that the environmental factor is used only to deaverage and not to recognize additional, potentially inefficient, locale-specific costs. But Verizon has shown, as a qualitative matter, that some additional locale-specific costs need to be allowed for, and while it has not shown, as a quantitative matter, how much of its actual costs may be attributed to inefficiency, it seems unreasonable to assume that figure to be more than 50%. Accordingly, we will not deny Verizon's exception outright but will recognize 50% of the costs at issue in its exception. (In other words, the statewide average environmental factor should be reduced to 1.185:1, and the regional factors should be adjusted pro rata.) That result strikes a fair balance, on the state of this record, between recognizing additional costs attributable to geographic variation and limiting the risk of allowing recovery of

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<sup>180</sup> Verizon's Brief on Exceptions, p. 41, fn. 105; Verizon's Reply Brief on Exceptions, p. 22, fn. 63.

<sup>181</sup> First Network Elements Proceeding, Exh. 135, response to ATT-NYT-255.



inefficiencies that should be excluded from a forward-looking study.<sup>182</sup> Correspondingly, the exceptions of AT&T and WorldCom, which would disallow the environmental factor entirely, are denied.

#### Link Cost Calculator

Verizon's link cost calculator pulls together the various loop cost inputs and calculates an overall result. AT&T alleged ten specific errors in the calculator's operation. Verizon's rebuttal testimony acknowledged and corrected for two of them, and the Judge resolved the remainder (including one as to which Verizon acknowledged the error but applied a correction AT&T deemed inadequate). Only those that continue to be at issue on exceptions are here discussed; the item designations are those applied by AT&T and used in the recommended decision.

Item D. AT&T adjusted the link cost calculator to eliminate the cost for copper riser cable in situations where fiber is assumed to go directly to the customer premises. The Judge was persuaded by Verizon's qualitative explanation that the situation at issue is one in which the fiber goes directly to the customer's building but that copper riser would still be needed to reach customers on upper floors, but he agreed with AT&T that Verizon had failed to establish the frequency with which copper would be needed on that account. He invited Verizon to provide further detail in its brief on exceptions.

In that brief, Verizon asserts that the forward-looking amount of intrabuilding copper needed in large building environments was taken into account in the feeder route survey, and comes to 162 feet. It submits as well an analysis based on Manhattan building height data which, it says, supports that result.

AT&T responds that Verizon has submitted not actual data but an analysis based on new, unsupported, extra-record

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<sup>182</sup> To state the matter differently, we are applying a very rigorous productivity adjustment to Verizon's figure, a step warranted by Verizon's reliance on actual data without any persuasive effort to remove the effects of inefficiency.

assumptions regarding building configurations in Manhattan. It objects in general to Verizon being allowed to supplement its evidence and urges us to scrutinize it skeptically.

The Judge properly found AT&T's total disallowance to be wrong in concept, and Verizon's presentation on exceptions establishes that it recognized a reasonable amount of copper riser cable in the situations at issue. No adjustment to the link cost calculator need be made on this account.

Item F. AT&T substituted an average installed pole price of \$417 for Verizon's range of \$385 to \$765 per pole. The Judge found that Verizon had demonstrated on rebuttal both the propriety of not using a statewide average and the flaws in AT&T's analysis, but he expressed concern about Verizon's uncritical reliance on unadjusted embedded pole costs. He recommended a 10% downward adjustment to Verizon's figures as an interim measure, instructing Verizon to present on exceptions an analysis of recent trends in its own pole costs. Verizon submits that analysis as Attachment 5 to its brief, and AT&T does not respond.

The current data submitted by Verizon suggest that the Judge's 10% downward adjustment to installed pole costs was conservative. A somewhat larger adjustment might be warranted, but in the absence of more definitive trends, we adopt the Judge's result.

Item G. Acknowledging an error pointed out by AT&T, Verizon corrected its study with respect to the sharing of poles with electric utilities and cable television companies. AT&T contended in brief, however, that Verizon had in effect taken back its concession by eliminating an adjustment to the multiple sheaths between poles that it believed was inappropriate in the distribution portion of the link. The Judge found that Verizon had not specifically shown why AT&T's multiple sheath adjustment was inappropriate but that AT&T, for its part, had never explained why the adjustment had been offered. He noted that while Verizon bears the burden of proof, its opponents have the burden of going forward with evidence challenging particular aspects of Verizon's study; in the absence of any such evidence,